



CHP  
TECHNICAL ASSISTANCE  
PARTNERSHIPS

# Texas Wesleyan University

## 800 kW CHP System

CHP packaged system helping save central plant expansion costs in Higher Education



### Quick Facts

- LOCATION:** Fort Worth, Texas
- MARKET SECTOR:** Higher Education
- POWER GEN. CAPACITY:** 800 kW
- EQUIPMENT:** 2G Energy's avus 800c
- FUEL:** Natural Gas
- IN OPERATION SINCE:** 2016
- TOTAL PROJECT COST:** \$6.2 million
- YEARLY ENERGY SAVINGS:** \$377,000
- FINANCIAL BENEFIT:** \$7.5 million savings over 20 years
- FACILITY LOAD:** System provides ~80% of power for approximately 80% of 83-acre campus.

### Site Description

Texas Wesleyan University is a university located in Fort Worth, Texas. The University was founded in 1890. Approximately 3,000 people, including students and faculty members, study and work on campus. In 2015, Texas Wesleyan launched a \$6.2 million energy-saving project. The centerpiece of this project is a Combined Heat and Power (CHP) system which delivers power to almost 473,000 square feet of the campus' 42 buildings. The self-funded project is expected to pay for itself in less than 20 years. The CHP portion of the project is estimated to save approximately \$377,000 and reduce grid power purchase by 5.9 million kilowatt-hours annually.

The natural gas-powered CHP plant is based on a packaged 800 kW reciprocating engine and a 250-ton absorption chiller. The plant also includes a new cooling tower, new heating boilers, pumping systems, and central plant optimization controls. The installation of a packaged CHP system and a new absorption chiller allowed the development of a new student center, avoiding a potential expansion costs of the existing central plant's building.

*In 2017, the University received the 2017 Energy Solutions Center (ESC) Partnership Award for Innovative Energy Systems in recognition of their investment in CHP. This award is an honor reserved for those energy users that have worked with their energy utility system to implement an innovative, energy-efficient natural gas strategy or solution.*

## CHP System Value Proposition and Benefits

“This endeavor was a multi-year capital improvement plant focused on sustainability” (J. Gresham, Director of Facilities Operations at Texas Wesleyan University). The goals of this project entailed generating energy savings, reducing utility costs for operations, reducing overall environmental emission, minimizing fluctuations in future costs, avoiding costs associated to the expansion of the existing central plant’s building, and addressing a large portion of deferred maintenance. The opportunity to create new infrastructure capacity and maximizing utility incentives for site enhancement provided further motivation. Additional benefits included improving the University’s technical expertise, having a facility to be showcased among their students and other members of the community during the next years, and comfort and aesthetics along with enhanced reputation and engagement among the University’s stakeholders. The University understood the significant benefit of undertaking such a project.

## CHP Equipment & Operation

The *avus 800c* is a standardized self-contained CHP unit developed by 2G yet customized based upon specific site needs. Powered with natural gas, this system produces electricity and hot water, expanding the capabilities of the existing central plant. It operates following the thermal demand of the campus and does not sell power back into the grid. The system doesn’t require natural gas compression and allows multiple starts and stops, taking into consideration power demand and electricity price signals among its control parameters. In the winter, the system supplies over 3 million BTU/hr of hot water (140°F) which displaces the need for more than 3.5 million BTU/hr of natural gas burned in a boiler. In the hot Texas summers, the system provides cold water for cooling (47°F) which reduces the electricity used by the electrical chillers. Payback period has been estimated around 16 years, depending on the final annual hours of operation achieved. During its first year of operation, the system worked around 2,500 hours but it is expected to reach 3,500 hours of annual operations once new buildings come online in 2019. This system is good example of one of the latest trends on CHP applications: CHP packaged systems.



## Lessons Learned

- The primary consideration for this installation was the direct economic benefit the system can provide, and this is largely determined by natural gas and power prices.
- Reduction of emissions served as significant motivation for CHP at this site.
- Having all stakeholders on board of a CHP project from the permitting, interconnection to purchasing and final-start-up is vital as it can coordinate advances avoiding development delays and contribute to successful deployment.

## For More Information

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Date produced: February 2019